



Development of the *2016-2017 ARFVTP Investment Plan Update* Revised Staff Report

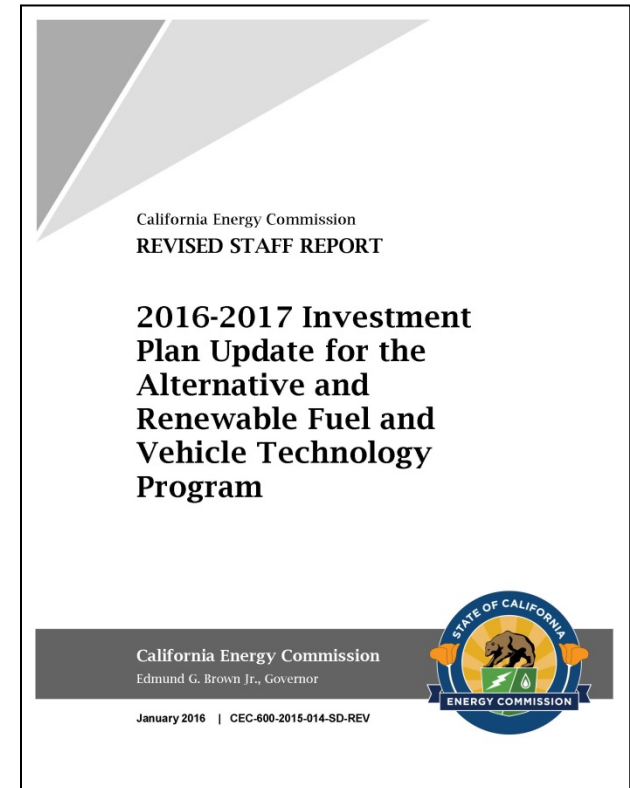
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Alternative and Renewable Fuel and Vehicle Technology Program
Advisory Committee Workshop
Long Beach, California
January 21, 2016



Investment Plan Purpose

- Basis solicitations, agreements and other funding opportunities using FY 2016-2017 funds
- \$100 million funding allocation for a portfolio of fuels, technologies, and supporting elements
- Funding allocations for categories (not individual projects)





Investment Plan Update Schedule

Activity	Date
Release Staff Report	October 22, 2015
First Advisory Committee Meeting	November 6, 2015
Release Revised Staff Report	January 7, 2016
Second Advisory Committee Meeting	January 21, 2016
Release Lead Commissioner Report	March 2016
Business Meeting Approval	April 2016



New Considerations for 2016-2017

- Sustainable freight
- LCFS re-adoption and updates
- Natural gas carbon intensity and low NO_x engines
- AB 8 reports on hydrogen stations and fuel cell vehicles



Notable Changes to the Revised Staff Report

- No changes to allocations
- Oversubscription rates for most recent solicitations
- Updated statistics through December 31, 2015
- Expanded discussion in specific sections
- Expanded discussion on program metrics



Structure of the *2016-2017 Investment Plan Update*

- Context of the Investment Plan Update
- Alternative Fuel Production and Supply
- Alternative Fuel Infrastructure
- Alternative Fuel and Advanced Technology Vehicles
- Related Needs and Opportunities
- Summary of Funding Allocations



ARFVTP Awards by Fuel Type

Fuel Type	Cumulative Awards to Date (in millions)	Cumulative Number of Projects to Date
Biomethane	\$50.9	16
Ethanol	\$43.6	19
Biodiesel	\$49.3	19
Renewable Diesel	\$12.1	5
Electricity	\$199.2	153
Hydrogen	\$113.0	72
Natural Gas	\$88.9	154
Propane	\$6.0	31
Multiple/Other	\$43.0	76
Total	\$606.0	545

As of December 31, 2015



Program Metrics

- Defined in statutes
 - benefit-cost assessments
 - petroleum reduction
 - GHG emission reduction
 - market transformation
 - technology advancement
 - sustainability
 - air quality benefits
 - economic development
- Weighting of metrics varies by solicitation
 - Depends on characteristics of each technology area
 - Cannot be applied equally to all project types



Biofuel Production and Supply

- Non-petroleum diesel substitutes, gasoline substitutes, and biomethane
- Opportunities exist for the ARFVTP to expand high-volume, low-carbon biofuel production in California
- Governor Brown's objective to reduce petroleum use in cars and trucks by up to 50 percent by 2030



Biofuel Production and Supply

- New discussion in Investment Plan on E85 distribution infrastructure
- Proposed \$20 million allocation
 - Covers multiple fuel types and multiple phases of technological maturation
- Policy Goals Supported:
 - GHG Reduction
 - Petroleum Reduction
 - In-State Biofuels Production
 - Low Carbon Fuel Standard



Electric Charging Infrastructure

Benchmarks towards 2020 ZEV Action Plan Goal

Scenario		Public & Private Non-Residential Level 2	Estimated ARFVTP Cost (\$ millions)	Public Fast Chargers	Estimated ARFVTP Cost (\$ millions)
Additional EVCS Needed	2017				
	Home-Dominant	13,659	\$20.5	-	-
	High Public Access	32,429	\$48.6	289	\$4.3
	2018				
	Home-Dominant	17,805	\$26.7	18	\$0.3
	High Public Access	40,239	\$60.4	364	\$5.5

Source: National Renewable Energy Laboratory



Electric Charging Infrastructure

- Cumulative awards to-date:
 - \$40.7 million in grants
 - 7,490 charging stations
- Potential emphasis on deployment of EVCS at multi-unit dwellings and fast chargers
- Utility-owned EVCS proposals pending approval by CPUC
 - Decision expected Q1 2016
 - Initial PG&E proposal rejected; phased approach approved



Electric Charging Infrastructure

- New discussion in Investment Plan on freight & fleet EVCS
- Proposed \$17 million allocation
- Policy Goals Supported:
 - GHG Reduction
 - Air Quality
 - Petroleum Reduction
 - ZEV Mandate
 - Low Carbon Fuel Standard

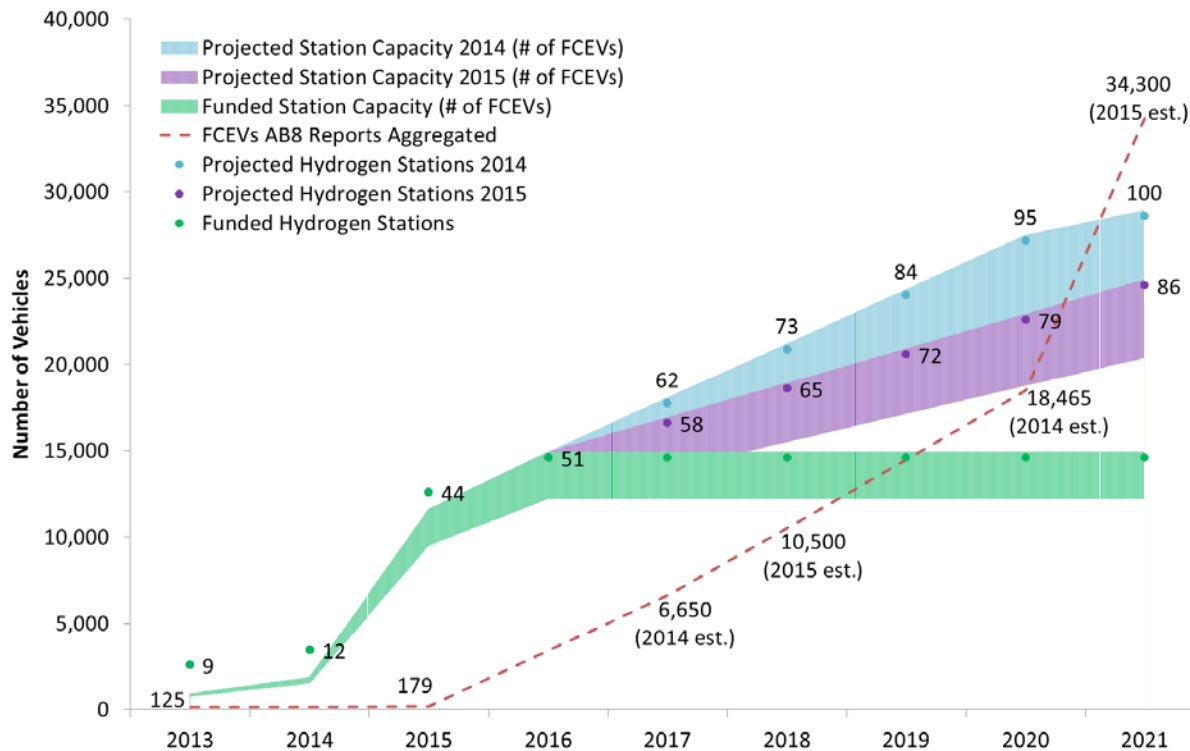


Hydrogen Refueling Infrastructure

- 23 stations operational as of December 31, 2015; includes 14 ARFVTP-funded stations
- Hyundai and Toyota FCEVs currently available
- Fueling station priority areas and purpose derived from AB 8 Annual Evaluation



Hydrogen Refueling Infrastructure



Local capacity shortfalls predicted 2018

Statewide capacity shortfalls predicted 2021

Source: California Air Resources Board



Hydrogen Refueling Infrastructure

- Proposed \$20 million allocation, consistent with recommendations in 2015 AB 8 Annual Evaluation
 - Estimated to be sufficient for 7 or 8 stations, plus O&M
- Operations & Maintenance funding needed to support business case of station developers
- Policy Goals Supported:
 - GHG Reduction
 - Air Quality
 - Petroleum Reduction
 - ZEV Mandate
 - Low Carbon Fuel Standard



Natural Gas Fueling Infrastructure

- Most private fleets can access capital for fueling station equipment, installation, and operation
- ARFVTP prioritizes school districts and other municipal fleets which have restricted access to capital
- Proposed \$2.5 million allocation
- Policy Goals Supported
 - Petroleum Reduction
 - Air Quality
 - Low Carbon Fuel Standard
 - GHG Reduction (w/ biomethane)



Natural Gas Vehicles

- Less favorable price difference compared to diesel
 - **October 2014:** CNG \$2.69, Diesel \$3.90. Difference = **\$1.21**
 - **October 2015:** CNG \$2.68, Diesel \$2.80. Difference = **\$0.12**
 - Fleets may be able to obtain more favorable CNG pricing
- LCFS re-adoption increased CNG carbon intensity



Natural Gas Vehicles

- Biomethane fuel opportunities
 - Revised carbon intensity values 50 to 125 percent below diesel for biomethane CNG
- Low NO_x engines available as soon as Q2 2016
 - NO_x emissions 90 percent lower than existing diesel standard
 - Initially available as 8.9 liter engine
 - 6.7 liter and 12 liter engines also expected



Natural Gas Vehicles

- Proposed \$10 million allocation
- Potentially limit incentives to low NO_x engines, if available for specific vehicle type and class
- Potentially target fleets through a separate solicitation to combine low NO_x engines with biomethane fuel use
- Policy Goals Supported:
 - Petroleum Reduction
 - Air Quality
 - Low Carbon Fuel Standard
 - GHG Reduction (w/ biomethane)



MD/HD Vehicle Technology Demonstration and Scale-Up

Class 3 through 8 Vehicles

- GVW of 10,001 lbs and above
- 3 percent of California vehicles
- 23 percent of on-road GHG emissions
- Significant opportunity to reduce GHG emissions
- Unique solutions required for each vehicle type and weight



Source: Oak Ridge National Laboratory



MD/HD Vehicle Technology Demonstration and Scale-Up

- Expansion of category scope
 - California Sustainable Freight Action Plan
 - Non-propulsion technologies
 - Refueling infrastructure
- New challenges
 - Higher costs for more advanced and more capable vehicles
 - Previous solicitation oversubscribed by 130%



MD/HD Vehicle Technology Demonstration and Scale-Up

- New opportunities
 - Many alternative fuel MD/HD vehicles now in “early adopter” phase of development
 - MD/HD vehicles can serve as a Vehicle-to-Grid asset
- Proposed \$23 million allocation
- Policy Goals Supported:
 - Petroleum Reduction
 - Air Quality
 - Low Carbon Fuel Standard
 - GHG Reduction



Related Needs and Opportunities

- Emerging Opportunities
 - Discussion on renewable hydrogen production
 - Proposed \$3 million allocation based on historical demand
- Workforce Training and Development
 - 14,700+ trainees; over 240 businesses assisted
 - Proposed \$2.5 million allocation based on anticipated need
- Regional Readiness
 - Continued need for planning and implementation support
 - Proposed \$2 million allocation



Next Steps for the 2016-2017 *Investment Plan Update*

- Seeking feedback from all stakeholders
 - Comments requested no later than February 1, 2016
 - E-commenting available at:
<http://energy.ca.gov/altfuels/2015-ALT-01/>
- Release Lead Commissioner Report in March 2016
- Adopt at Business Meeting in April 2016



Voluntary Survey

- Ensure diverse participation in Energy Commission R&D programs
- Used for public reporting purposes for statistics regarding anonymous overall attendance of workshops
- Please complete survey or email responses to:
Tami.Haas@energy.ca.gov



Proposed Funding Allocations

Category	Funded Activity	Proposed Funding Allocation
Alternative Fuel Production	Biofuel Production and Supply	\$20 million
Alternative Fuel Infrastructure	Electric Charging Infrastructure	\$17 million
	Hydrogen Refueling Infrastructure	\$20 million
	Natural Gas Fueling Infrastructure	\$2.5 million
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	\$10 million
	Medium- and Heavy-Duty Advanced Vehicle Technology Demonstration and Scale-Up	\$23 million
Related Needs and Opportunities	Emerging Opportunities	\$3 million
	Workforce Training and Development	\$2.5 million
	Regional Readiness	\$2 million
	Total Proposed	\$100 million



Backup Slides



CALIFORNIA ENERGY COMMISSION

Category	Funded Activity	2014-2015	2015-2016	2016-2017 (Proposed)
Alternative Fuel Production	Biofuel Production and Supply	\$20	\$20	\$20
Alternative Fuel Infrastructure	Electric Charging Infrastructure	\$15	\$17	\$17
	Hydrogen Refueling Infrastructure	\$20	\$20	\$20
	Natural Gas Fueling Infrastructure	\$1.5	\$5	\$2.5
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	\$10	\$10	\$10
	Light-Duty Electric Vehicle Deployment	\$5	-	-
	Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up	\$15	\$20	\$23
Related Needs and Opportunities	Manufacturing	\$5		
	Emerging Opportunities	\$6	\$3	\$3
	Workforce Training and Development Agreements	\$2.5	\$3	\$2.5
	Regional Alternative Fuel Readiness and Planning	-	\$2	\$2
Total		\$100	\$100	\$100